New Developments of Laser Desorption Ionization Mass Spectrometry in Plant Analysis

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Résumé en anglais	The structural identification of natural products is one of the major focus areas of analytical chemistry research. Mass spectrometry (MS) has long been used to obtain molecular weights and further molecular formulae. In the past, former ionization sources such as electronic impact unfortunately limited MS analysis to predominately volatile, polar, and thermostable compounds. However, recent developments in soft ionization techniques such as electrospray ionization (ESI), atmospheric pressure chemical ionization (APCI), or laser desorption/ionization (LDI) have gradually extended MS analysis to a much wide range of chemical structures. As far as small natural compounds are concerned, LDI sources are still seldom used because of specific technical limitations. Indeed, the photoionization process of LDI is generally assisted by a matrix, which is a small molecule carrying strong UV chromophore. The process is then called matrix-assisted laser desorption/ionization (MALDI) process. MALDI ionization therefore induces the formation of numerous matrix ions that commonly appear in the range 0–600 Da, and consequently interfere with molecular ions originating from many natural products. For this reason, the correct signal assignment is highly impaired in the critical region of interest. As LDI and MALDI are not only soft ionization processes but also quite sensitive techniques yielding high resolution spectra when coupled to a time-of-flight (TOF) analyzer, different attempts have been made to adapt these techniques for the analysis of natural products. Three of them will be more specifically discussed in this chapter: (i) LDI on neat gold surfaces obtained by physical vapor diffusion (PVD), (ii) desorption/ionization on self-assembled monolayer surfaces (DIAMS), and (iii) the use of specific matrices for the selective detection of alkaloids.
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